

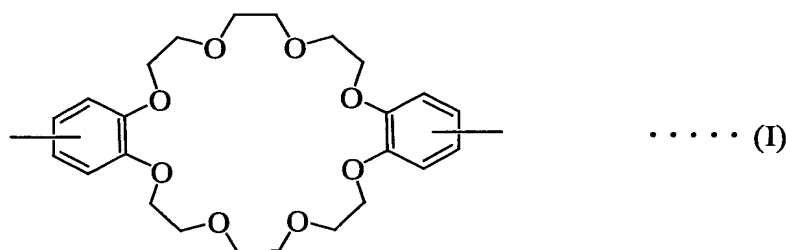
What is claimed is:

1. A crosslinked body of the invention characterized by crosslinking plural polymers through mechanical bonding with a rotaxane structure consisting of a shaft and a ring(s).

2. A crosslinked body according to claim 1, wherein the polymer has a plurality of large cyclic structures corresponding to the ring of the rotaxane structure.

3. A crosslinked body according to claim 2, wherein the polymer is a polycrown ether.

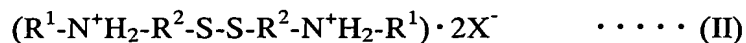
4. A crosslinked body according to claim 3, wherein the polycrown ether has a crown ether unit represented by the following formula (I):



5. A crosslinked body according to claim 4, wherein the polycrown ether contains the crown ether unit of the formula (I) and a urethane bond.

6. A crosslinked body according to claim 3, wherein the polycrown ether is formed by mechanical bonding with a bifunctional ammonium salt having a disulfide bond.

7. A crosslinked body according to claim 6, wherein the bifunctional ammonium salt having the disulfide bond is represented by the following formula (II):



(wherein  $R^1$  is a bulky group larger than a hole size of the crown ether unit in the polycrown ether,  $R^2$  is a bivalent hydrocarbon residue, which may include a hetero atom, and  $X^-$  is a monovalent anion).

8. A crosslinked body according to claim 3, wherein the polycrown ether is formed by mechanical bonding with a bifunctional ammonium salt having two urethane bonds.

9. A crosslinked body according to claim 8, wherein the bifunctional

ammonium salt having two urethane bonds is represented by the following formula (III):



(wherein  $R^1$  is a bulky group larger than a hole size of the crown ether unit in the polycrown ether,  $R^3$  and  $R^4$  are independently a bivalent hydrocarbon residue, which may include a hetero atom, and  $X^-$  is a monovalent anion).

10. A crosslinked body according to claim 1, wherein the polymer corresponds to the shaft of the rotaxane structure.

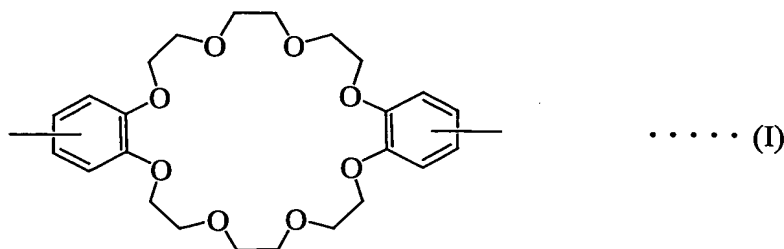
11. A crosslinked body according to claim 10, wherein the polymer is a polyurethane.

12. A crosslinked body according to claim 11, wherein the polyurethane is formed by mechanical bonding with a biscrown ether.

13. A method of producing a crosslinked body, which comprises crosslinking a polymer having a plurality of large cyclic structures and a bifunctional ammonium salt having a disulfide bond in the presence of thiols through mechanical bonding with a rotaxane structure.

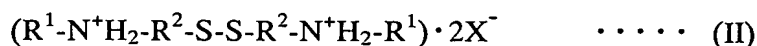
14. A method according to claim 13, wherein the polymer having a plurality of large cyclic structures is a polycrown ether.

15. A method according to claim 14, wherein the polycrown ether has a crown ether unit represented by the following formula (I):



16. A method according to claim 15, wherein the polycrown ether has the crown ether unit of the formula (I) and a urethane bond.

17. A method according to claim 13, wherein the bifunctional ammonium salt having the disulfide bond is represented by the following formula (II):



(wherein  $R^1$ ,  $R^2$  and  $X^-$  are the same meanings as mentioned above).

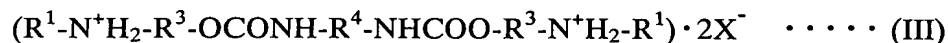
18. A method of producing a crosslinked body, which comprises

polymerizing [3]rotaxane consisting of one shaft and two polymerizable rings at portions of the rings.

19. A method according to claim 18, wherein a molecule constituting the polymerizable ring is a crown ether.

20. A method according to claim 18, wherein the molecule constituting the shaft is a bifunctional ammonium salt having two urethane bonds.

21. A method according to claim 20, wherein the bifunctional ammonium salt having the two urethane bonds is represented by the following formula (III):



(wherein  $R^1$ ,  $R^3$ ,  $R^4$  and  $X^-$  are the same meanings as mentioned above).

22. A method of producing a crosslinked body, which comprises polymerizing a pseudorotaxane formed by inserting a polymerizable chain molecule into each ring of a compound having two large cyclic structures at a portion of the chain molecule.

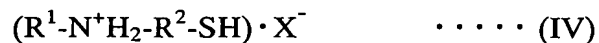
23. A method according to claim 22, wherein the compound having two large cyclic structures is a biscrown ether.

24. A method of producing a crosslinked body, which comprises crosslinking a polymer having a large cyclic structure and a chain molecule corresponding to a shaft under heating.

25. A method of recycling a crosslinked body, which comprises decrosslinking a crosslinked body as claimed in any one of claims 1 to 12 under heating.

26. A method of recycling a crosslinked body, which comprises decrosslinking a crosslinked body as claimed in claim 6 or 7 in the presence of thiols.

27. A method according to claim 26, wherein the thiol is represented by the following formula (IV):



(wherein  $R^1$ ,  $R^2$  and  $X^-$  are the same meanings as mentioned above).